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**From:** Lisa Rector [lrector@nescaum.org]  
**Sent:** 9/30/2020 8:08:18 PM  
**To:** Johnson, Steffan [johnson.steffan@epa.gov]  
**CC:** gallen@nescaum.org; Kelli O'Brien (kelli@clearstak.com) [kelli@clearstak.com]; Brian Vinal [brian@clearstak.com]  
**Subject:** FW: Cordwood Furnace 1  
**Attachments:** 092920-ImportGeneralAverageReport.xlsm; 092920 CSA B415 1 Spread Sheet V2\_4.xls; 092520 CSA B415 1 Spread Sheet V2\_4.xls; 092520-ImportGeneralAverageReport.xlsm; cordwoodFurnace1Heatoutput.xlsx

Hi Stef, sorry to bother you, but I was hoping you or one of your staff could help us out as we try to untangle how to determine what maximum load is for a unit that has been on the stand. We have completed two Cat IV tests with oak cordwood with the appliance. One run ran with the device in manual mode. The other run ran the unit in auto operation mode.

After those tests, the maximum heat output was calculated using two methods (1) CSA B415 per annex E, *Direct Measurement of the Output and Efficiency of Central Furnaces*, and (2) heat output calculated using the CSA B415 big spreadsheet. The numbers from those calculations had significant differences, as detailed below.

9/25/20 Manual operation, duct fan was on the entire test run.

Annex E Calculations = 27,911 btu/hr

CSA spreadsheet = 48,743 Btu/hr

9/29/20 auto\* operation, duct fan on and off per furnace

Annex E = 22,253 Btu/hr

CSA spreadsheet = 47,882 Btu/hr

The appliance does lose heat in the jacket ('Unit2' tabs of import general average report), which may explain why the CSA spreadsheet heat output is higher. However, the heat output in the duct also seems very low and raises additional questions. Another set of eyes looking at this data would be helpful. Perhaps, we've made a calculation error. If we haven't, would you expect such a spread between the two CSA calculations? If they are correct, which value should we use to determine target loads for the other test runs?

Any insights you could provide, would be appreciated. Thanks!

Thanks!

Lisa

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